

What is claimed is

1. An apparatus for compressing an animation path, comprising:
 - an interpolator analysis unit for extracting a predetermined number of break points from an animation path and outputting keys and key values corresponding to the break points;
 - a key coder for coding keys output from the interpolator analysis unit;
 - a key value coder for coding key values output from the interpolator analysis unit; and
 - an entropy encoder for entropy encoding the keys and key values which are coded in the key coder and key value coder, respectively, and outputting encoded bit streams.
2. The apparatus of claim 1, wherein the interpolator analysis unit determines the number of break points so that the difference between an approximated animation path, which is obtained by the predetermined number of break points extracted among the break points of the original animation path, and the original animation path is minimized.
3. The apparatus of claim 1, wherein the key coder codes the keys output from the interpolator analysis unit by Differential Pulse Code Modulation (DPCM) quantization method.
4. The apparatus of claim 1, wherein the key value coder codes the key values output from the interpolator analysis unit by DPCM quantization method.
5. The apparatus of claim 1, wherein taking both end points of the original animation path as starting points, the interpolator analysis unit finds break points representing an approximated path which has the smallest difference from the original animation path, among break points, and this process is repeated until an approximated animation path is close to the original path.

6. The apparatus of claim 5, wherein break points are determined so that the area difference between the original animation path and an approximated animation path is the smallest.

7. The apparatus of any one of claim 3 or claim 4, wherein the DPCM quantization is coding the difference between a current value and the immediate previous value, or is coding the difference between a current value and an approximated value which is obtained by adding the immediately previous value to the difference between the immediately previous value and the previous value thereof.

8. An apparatus for reconstructing an animation path, comprising:
an entropy decoder for receiving an encoded bit stream and entropy decoding the bit stream;
a key decoder for receiving the entropy decoded result and decoding keys;
a key value decoder for receiving the entropy decoded result and decoding key values; and
an interpolator reconstruction unit for obtaining empty key values by linear interpolation based on the keys and key values decoded in the key decoder and the key value decoder, respectively, and reconstructing the original animation path.

9. The apparatus of claim 8, wherein the key decoder decodes the entropy decoded result which is input from the entropy decoder by DPCM dequantization method.

10. The apparatus of claim 8, wherein the key value decoder decodes the entropy decoded result which is input from the entropy decoder by DPCM dequantization method.

11. A method for compressing an animation path comprising the steps of:

extracting a predetermined number of break points from an original animation path;

extracting keys and key values using the extracted break points, and coding the keys and key values; and

entropy encoding the coded keys and key values to obtain encoded bit streams.

12. A method for reconstructing an animation path comprising the steps of: receiving and entropy decoding an encoded bit stream; decoding keys and key values from the result of entropy decoding; and reconstructing an original animation path by obtaining empty key values by linear interpolation based on the decoded keys and key values.

13. A data format of a bit stream which is obtained by encoding an animation path, the data format comprising:

an array-type key flag for indicating key values of which axes are selected among key values corresponding to an x, y, or z coordinate of each break point of the animation path;

an array-type key for indicating that at least one or more key values are selected among key values corresponding to an x, y, or z coordinate of each break point; and

array-type key values for indicating key values selected for each break point.

14. The data format of claim 12, further comprising: minimum values of key values corresponding to X, Y, and Z coordinate axes; and

maximum values of key values corresponding to X, Y, and Z coordinate axes.

15. The data format of claim 12, wherein the array-type key flag includes M data and M is equal to or less than the number of original keys.

16. The data format of claim 12, wherein the array-type key includes M data and M is equal to or less than the number of original keys.

17. The data format of claim 12, wherein the key values include p ($\leq n$) first key values corresponding to the x axis, q ($\leq n$) second key values corresponding to the y axis, and r ($\leq n$) third key values corresponding to the z axis and n denotes the number of keys.

18. A method for extracting break points of an animation path comprising the steps of:

(a) selecting two break points on both end points of the original animation path, among break points on the animation path;

(b) selecting one break point among the remaining break points excluding the two selected break points;

(c) interpolating for key values of the remaining break points excluding the selected break points, using the selected break points;

(d) forming an approximated path based on the selected break points and the interpolated key values, selecting an approximated animation path which has the smallest path difference between the original animation path and the approximated animation path, and selecting break points corresponding to the selected animation path; and

(e) selecting one break points among remaining break points excluding the break points selected in steps (a) and (b), and repeating steps (c) to (e) until the path difference is less than an allowable difference.

19. The method of claim 18, wherein the path difference is expressed by the sum of areas of trapezoids or twisted trapezoids which are formed by the original animation path and the approximated animation path.

20. The method of claim 18, wherein in an orientation interpolator, the path difference is defined as a differential rotation angle in a differential rotation transformation, which is the difference between a rotation transformation of the original animation path and a rotation transformation of the approximated path.

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